

Food Aid and Adult Nutrition in Rural Ethiopia

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Abstract

Understanding the role that safety nets play in adult nutrition is an important contribution to understanding the dynamics of poverty in developing countries. In this paper, I use panel data from rural Ethiopia on individual nutritional status to test whether there is an effect of public transfers on nutrition levels for adults. I run individual fixed effects regressions of nutritional status, measured by adult body mass index, on aid receipts. Results show that among adult household members, male adult members are the primary beneficiaries of food aid. Male and female aid recipients tend to invest aid receipts in male household members. These results are consistent with a theory in which additional resources are allocated to members of the household whose market returns are higher or engage in activities that expend higher levels of energy. For high-asset households, female household members benefit if the aid recipient is a female. Women in low asset households appear to be adversely affected by aid receipts, and evidence suggests that women with little bargaining power suffer the most. The results suggest that aid receipts are useful in mitigating fluctuations in adult BMI over a short time period.

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1 Introduction

The role of food aid has played an important role in Ethiopia, and many developing countries, for disaster relief, development, and as a means to reduce vulnerability to agricultural shocks. The literature on food aid primarily falls into three categories: 1.) targeting, 2.) incentive effects, and 3.) health effects. Focus on aid targeting became important in the nineties as the availability of world food aid began to decline and donors became concerned about how well intended beneficiaries were benefiting from aid programs.¹ The literature on the dependency problems associated with aid and the incentive effects of transfers on labor supply and productivity has always been of interest to researchers and continues to be as improvements in data quality and availability increase from developing countries.

This paper departs from the literature on targeting and incentives and focuses on the effects of food aid on individual adult nutritional status, as measured by Quetelet's body mass index (BMI). Whereas many studies have looked at the nutritional status of children,² very few studies have focused attention on the nutritional status of adults in developing countries with the exception being the theoretical models of nutritional-based efficiency wages.³ These models set up the framework for understanding the importance of nutrition in poor countries because poor nutrition among potential labor market participants can lead to poverty traps if energy deficiency prevent them from participating in the labor market. In short, the structure of individual productivity in extremely poor areas, whether it is on one's own plot of land or in wage labor, heavily depends on an individual's health (Behrman, 1993). Subsistent farmers have been identified as individuals that risk threats to their food security and access to food assistance programs can protect them from adverse shocks such as harvest failures (Barrett, 2002). Dercon and Krishnan (2000) show that individuals in poor households are unable to smooth their consumption over time and the lack of consumption smoothing can lead to detrimental fluctuations in adult nutrition. Understanding the role that safety nets play in adult nutrition is an important contribution to understanding the dynamics of poverty in developing countries.⁴

¹ A number of papers have focused on how well aid is targeted across areas and across households and which targeting mechanisms (administrative versus community level targeting) are most effective in identifying needy households (Barret, 2001; Shapouri and Missiaen, 1990; Zahariadis et al., 2000; Jayne et al., 2002; Clay et al., 1999; Dercon and Krishnan, 2003). There has been mixed reviews on how well aid has been targeted in Rural Ethiopia, previous studies have suggested that there are strong regional biases in targeting uncorrelated with need (Jayne et al., 2002 and Clay et al., 1999) while household targeting was found to be marginally better than a random allocation of aid across households (Clay et al., 1999 and Dercon and Krishnan, 2003). Other papers on household targeting in Rural Ethiopia suggest that most of the targeting takes place in identifying needy households but not in distinguishing differing amounts of aid across aid recipients (Sharp, 1994 and Broussard et al., 2009).

²See Quiumbing (2003) and Yamano et al. (2005) for studies from Ethiopia.

³For a more detailed analysis see Mirrlees (1975), Stiglitz (1976) and Dasgupta and Ray (1986).

⁴Bezuneh and Deaton (1997) discuss the role that food aid (in particularly food-for-work) can play as part of safety net strategies.

Public transfers to households can be viewed as positive shocks and shared across household members. The distribution of aid within the household has received very little attention, but it is important to know if aid improves nutritional status, or mitigates adverse shocks to household consumption, and which household members benefit most from aid receipts. This is important because if aid does indeed improve nutrition then aid may also have an impact on productivity through a nutrition-productivity link (Dasgupta, 1993). This link has been modeled by a nonlinear relationship between nutrition and work capacity, taking into account the fact that the body requires a certain minimal amount of nutrition before productivity gains begin to kick in. This relationship between nutrition and work capacity has been used to explain inequality and unemployment in poor countries but also to explain unequal distributions within the household, where it may be more efficient to allocate more resources to individuals who have higher market returns to nutrition.⁵ As Barrett (2002) describes, each individual is endowed with labor, the primary factor in production, food insecurity can lead to low labor productivity.

The link between nutrition and productivity highlights the tradeoff between efficiency and equity. On one hand, if resources to the household are insufficient for an acceptable standard of living, unequal division of resources may exist beyond the basic fundamental differences in minimal requirements in nutrition, care, and economic resources as households allocate resources to individuals with the highest returns.⁶ On the other hand, if there is a desire for equal distributions of resources, then if resources are insufficient to ensure that individuals are healthy enough to be productive in the labor market, the resulting outcome will be a cycle of poverty.⁷

Current adult nutritional status depends on past investments in health, requirements for maintenance of the body, current physical activities and energy expenditures, and health endowments. While the effects of public transfers on adult nutrition is an important question, empirical testing can be complex due to heterogeneity in energy expenditure, health endowments and nutrient requirements, many of which are unobserved to the econometrician. In much of the literature on nutritional status, energy expenditures have been ignored while health endowments have been assumed the same across household members. Not controlling for individual heterogeneity may bias regression results. Using a rich panel dataset, this paper runs individual fixed effects regressions

⁵These models ignore bargaining power; women with more bargaining power may demand more resources to ensure their minimal requirements are met so that they can be productive in their own activities. See Chiappori, 1992, Bourguignon et al., 1993; Browning et al., 1994.

⁶This is known as the lifeboat problem: poor households who are liquidity constrained may have to allocate scarce resources to individuals in the household who may be most productive.

⁷The tendency to equally distribute aid receipts among aid recipients has been one argument for the apparent ineffectiveness of aid in many poor African villages. Pitt et al. (1990), using a sample of households from 15 villages in Bangladesh, found results that were consistent with the sampled households being averse to unequal health outcomes. Because men are more likely to engage in activities that require higher levels of energy expenditure, they are the individuals most hurt by these preferences.

to eliminate time-invariant individual effects such as health endowments to investigate the effect of food aid on adult nutrition. Without knowing individual consumption of aid it is impossible to assess intra-household allocations directly but this paper attempts to infer distributional impacts while controlling for individual heterogeneity.

Food aid can play an important role in buffering the effects of adverse shocks in poor, liquidity constrained households.⁸ Public assistance primarily comes during times of aggregate shocks such as droughts and most village households become eligible for assistance.⁹ The impact aid has on adult household members is important because these are the members who insure the survival of the household through a number of labor intensive activities (both men and women).

The effects of food aid on health is also important for policy. The Ethiopian government has stressed a need to link relief with development. In accomplishing this goal, they have focused on timely targeting, ensuring that ‘no able-bodied person should receive food aid without working on a community project in return’ (TGE, 1993), preventing asset depletion, and improving productivity. If food aid benefits households through improved health then this benefit should be included in discussions concerning the benefits of aid programs.

This paper looks at a sub-group of the household, namely adult men and women between the ages of 17 and 55, and investigates the effects that food aid has on adult nutrition. I investigate whether livestock assets play a role in the decision rule for how aid is allocated within the household. For asset-poor households, equal distributions or distributions to non-productive household members may not be feasible (Stiglitz, 1976) and therefore the bulk of public assistance may flow to male or healthier household members, whose returns to nutrition may be higher. Alternatively, additional household resources, such as food aid, may flow to the least healthiest members or to members with little bargaining power. For asset-rich households, these households may be able to protect themselves from the severity of the shocks through the sell of their assets and therefore allocate the additional resources to weaker household members. I also investigate if women with more bargaining power are able to demand more aid resources.

I use panel data from rural Ethiopia on individual nutritional status to test whether there is an effect of public transfers on nutritional levels for adults and whether the effect differs depending on the gender of the aid recipient and/or the gender of the individual. I then split the sample of households into low and high asset households to investigate if aid is invested differently among

⁸Hoddinott and Kinsey (2000) find that droughts reduce the body mass of women but not men. Gilligan and Hoddinott (2007) shows that food aid has long lasting effects on consumption growth and food security, but the effects depend on the type of aid program.

⁹This is particular true in the villages surveyed in the Ethiopian Rural Household Survey where many of the selected villages had suffered from the 1984-1985 famine.

household members depending on the level of assets the household possesses. The rest of the paper is as follows. Section 2 presents a conceptual model on the link between health and productivity. Section 3 describes the food aid programs in rural Ethiopia. Section 4 describes the measure of adult nutrition, Body Mass Index, used in this paper. Section 5 describes the data. Section 6 presents the empirical specification followed by section 7 which discusses the results. Section 8 concludes.

2 Conceptual Model

To understand the indirect effect of food aid on productivity, an understanding of how aid impacts health is important.

Following Pitt et al. (1990) and Rosenzweig and Schultz (1982), health status in each period is characterized by a health production function that depends on consumption (c), energy expenditure (e) and individual health endowment (u):

$$H = H(c, e, u), \tag{1}$$

where $H_c > 0$ and $H_e < 0$. Consumption boosts nutrition, while energy expenditure deplete nutrition. Individual health endowment is the component of health that is not influenced by consumption or energy expenditure.

The return to labor is given by the following equation:

$$W = W(e, H) \tag{2}$$

where $W_e > 0$, $W_H > 0$, and $W_{eH} > 0$. Energy expenditure (effort) and health are rewarded in the labor market with health augmenting the returns to effort. Equation (2) represents the returns to both wage-labor and agricultural production. The wage function is allowed to differ across men and women to reflect differences in household activities. For example, women engage in household activities and farming activities which expend less energy while men engage in more labor intensive activities such as ploughing.

The household utility function for a household with a male (m) and female (f) member can be characterized as:

$$U(h_m, h_f, c_m, c_f, e_m, e_f) \tag{3}$$

where both health (h) and consumption (c) increase welfare while energy expenditure lower utility.

The allocations of food and energy expenditure is determined from the solution to the maximization problem:

$$\max_{\{c_m, c_f, e_m, e_f\}} U(h_m, h_f, c_m, c_f, e_m, e_f) \quad (4)$$

subject to

$$a_m + a_f + \sum_{i=m,f} w_i - p \sum_{i=m,f} c_i = 0 \quad (5)$$

where a_m and a_f is non-labor income (aid) to male and female household members respectively and p is the price of the food good.

The first order conditions for the allocations of food and energy are:

$$\frac{du}{dh_i} \frac{dh}{dc_i} + \frac{du}{dc_i} = \lambda [p - \frac{dw}{dh_i} \frac{dh}{dc_i}] \quad (6)$$

$$\frac{du}{dh_i} \frac{dh}{de_i} + \frac{du}{de_i} = -\lambda [\frac{dw}{de_i} + \frac{dw}{dh_i} \frac{dh}{de_i}] \quad (7)$$

where λ is the marginal utility of income.

Condition (6) states that the marginal cost of allocating an additional unit of food to household member i is lower the greater health augments labor returns. Condition (6) highlights why there may be unequal food distributions within the household beyond individual minimal food requirements. Condition (6) also suggests the potential productivity gains of aid. If aid flows to the most productive household members then aid may allow the household to secure enough resources to remain productive by protecting the household from falling below an unproductive state.

If household allocations are pareto-efficient, solve (4) subject to (5), and men and women have different preferences, then the demand functions for food consumption and effort depend on prices and gender specific non-labor income.

3 Public Transfers in Ethiopia

Public transfers in Ethiopia primarily come in two forms, free distribution (FD) and food-for-work (FFW). FD is targeted towards needy households with no work requirements whereas participants in FFW programs work on community development projects in return for a wage in the form of food. 80% of all food assistance programs are FFW. The Ethiopian government is committed

to ensuring that no able-bodied person should receive food aid without working on a community project in return, FD should supplement FFW programs and only be targeted to households that do not have a household member who can work. In practice, during the time of the survey, this was not the case, villages did not receive both forms of assistance.¹⁰

In this paper I focus exclusively on aid that comes in the form of FD.¹¹ Looking at FD as opposed to FFW is beneficial for a number of reasons. First, because FFW has work requirements it is unclear how FFW will impact adult nutrition: as additional energy is being provided from the food assistance, additional energy is also being burned in the form of work requirements or as other household members take on additional tasks while the FFW participant works outside of the household.¹² Secondly, unlike FFW, FD can be viewed as unearned income and shared among all household members. This second reason is crucial for the analysis in this paper. FD is administered based on household characteristics and is only to be distributed to a particular household member; a single individual does not have claim to FD. FFW, on the other hand, depends on household and individual characteristics. The individual must be able to work and must be able to travel to the FFW site. Multiple household members are eligible to participate in a FFW project. Because of the work requirements and the eligibility of multiple household members, FFW can be seen as individual wages.¹³ For FD, the household member who is eligible to receive the food aid for the household from the distribution site depends on who is administering the food aid program, the Ethiopian government or a non-government organization (NGO). The aid recipient is not a household decision but is determined by the aid agency. The government run food aid programs require the household head to pick up the aid from the distribution site, while many of the NGOs target women and young children under the age of five, household members who are considered to be at risk for poor nutrition.

To identify emergency food needs, assessments are carried out at least twice a year to capture the different rainfall seasons. Official documents suggest that there are at least two levels at which food needs are assessed: the Wereda or district level and the household level. Members representing the government, international donors, and non-government organizations conduct Wereda level

¹⁰This paper is concerned with the effects that safety nets, in the form of food assistance, has on adult nutrition. Because food assistance comes in two forms, free distribution or food-for-work, the selection into these programs may be endogenous. While villages do not receive both FFW and FD in the same round, three villages do receive a FFW program during the period used and I do have to be concerned about isolating the effect of free distribution over time.

¹¹Bezuneh et al. (1988) and Athanasios et al. investigate the role of FFW on nutritional status.

¹²In some villages the timing of FFW programs overlap with peak agricultural periods or conflict with other household productive activities.

¹³Quisumbing (2003) presents the case that FFW can be seen as a factor that effects the individuals relative desirability of being outside of the household. Since opportunities for women are rare in rural Ethiopia, gender-specific targeting in FFW programs can increase women's options outside of marriage.

assessments while representatives within villages identify needy households.¹⁴

Anthropological studies for Ethiopia show that community members do have knowledge of the needs of different families (Sharp, 1997), but the effectiveness with which they use this information has been debated and criticized. It has been argued that village representatives are reluctant to exclude households from receiving aid, so that there is a much larger number of households receiving aid than intended. The result being that the aid receipts are too small to have any real impact on nutrition. Many studies have found that selection into public assistance programs heavily depends on household income, with the likelihood of receiving aid decreasing as household income increases. On the other hand, income has been shown to play little or no role in determining how much aid recipients receive. To deal with the issue of selection into aid programs and to identify how food aid is distributed within the household the sample consist only of households which received aid. Broussard et al. (2009) showed that unobservable variables correlated with wealth and power helped determine how much aid a household received. This can cause a problem with the analysis if these unobservables are correlated with health status. Consistent estimates are feasible by using fixed effects and controlling for time-varying covariates that determine aid allocations across households.

4 Nutrition and Productivity

There is growing interest in the relationship between health and labor market outcomes. There is a general consensus that there exists a positive relationship between health and income but drawing causal interpretations requires dealing with a number of econometric issues.¹⁵ The relationship between nutrition and income can be used to argue the continued role of aid programs in poor villages, where food shortages are common place. Food aid as emergency relief provides the short-run benefits of filling the food gap in times of food shortages, but a long-run benefit that has been overlooked, and is the focus of this paper, is it's potential benefits to nutrition, an important form of human capital.

In order to assess the role of aid on nutrition there must first be an acceptable measure of nutritional status. The Quetelet body mass index (BMI) is a measure widely used to define nutritional status of adults. It is measured as weight in kilograms divided by height in meters squared. The Quetelet index is used as a measure of adult nutritional status in order to test the effects of food aid. The use of the Quetelet index in this paper has a number of advantages: it is easy to obtain; it does

¹⁴Each Wereda has between one and five food distribution sites where the household representative must come to collect the aid.

¹⁵Refer to Strauss and Thomas (1998) for a review of the literature.

not suffer from measurement error the way other measures of nutrition do; it is closely related to individual's food consumption levels; and it is available at the individual level. The Quetelet index has been proposed as an objective measure of chronic energy deficiency in adults.¹⁶ Cutoffs that classify individuals as malnourished have not been completely established but what is clear is that low Quetelet indexes are associated with decreases in work output and the inability to sustain productivity for an extended period of time. The Quetelet index has been shown to fluctuate over short time horizons due to seasonal fluctuations and shocks that may affect food consumption, and there is a general consensus that large fluctuations over a short time frame are detrimental. The Quetelet index is an objective measure of adult nutrition and is believed to be highly correlated with individual food consumption.

Figures 1 through 3 depicts the distribution of adult BMI for the full sample and separately for low and high asset households. The graphs show the estimated density functions of BMI by round for the total sample and for men and women separately. Modal BMI is approximately the same for both males and females at an index of 20, it is slightly lower for male adults. The variance of BMI is highest among low-asset households, households with livestock holdings less than the village's median level of livestock holdings. Most of the variance for low-asset households appears to be driven by the male sample. Modal BMI goes from an index of 19 in round one to an index of 20 in round two, back to an index of 19 in round three. Females in high-asset households tend to have a higher variance of BMI. The graphs provide a graphical representation of BMI fluctuations over the short time frame of the survey. The figures also suggest that asset holdings, in the form of livestock holdings, may play a role in how households are able to cope with shocks and which household members may be hit hardest by income shocks.

5 Data

In this paper I use panel data on 292 households with 363 adult men and 346 adult women from the first three rounds of the Ethiopian Rural Household survey (ERHS). The ERHS interviewed 1,477 households three times between 1994 and 1995. The time between each round is approximately six months. The survey was administered by the International Food Policy Research Institute (IFPRI) in collaboration with the department of economics at Addis Ababa University (AAU) and the Center for the Study of African Economies (CSAE) at Oxford University.

¹⁶ Chronic energy deficiency is defined as a "steady state" where an individual is in energy balance despite the low body weight and low body energy stores. Refer to Shetty and James' "Body Mass Index-A Measure of Chronic Energy Deficiency in Adults."

The survey provides information on health, individual characteristics, income earned from a number of work-related activities and private or public transfers on over 9,000 adults and children. Data on consumption and assets are available at the household level. The analysis is restricted to six of the fifteen sampled villages due to the fact that these were the only villages that received FD during the 1994-1995 survey rounds. In these six villages, only households that received aid in at least one round (292 of the 549) are used in the analysis. Additionally, only households with information on at least one adult male and one adult female were used in the analysis to avoid drawing conclusions on households with adults of only one sex. This selection left a final sample size of 363 women and 346 men across 292 households (each with at least two observations on health over a one year period).¹⁷

Each household member's weight and height was collected in each round, this information was used to calculate the individual's BMI score. The variable of interest is household aid receipts. The ERHS has detailed information on whether the household received aid, how much aid the household received, the source from whom the aid was received and whether the aid was given in-kind or in-cash. All gifts from the government or non-government organizations received by the household and reported as food aid or a donation¹⁸ makes up the measure of free distribution.¹⁹ Most aid is received in-kind and comes in the form of wheat, maize, sorghum and cooking oil. To convert aid into cash equivalents, the amounts were first converted to kilograms and then converted to cash equivalents using local village prices from 1997.

The survey asked each member of the household if they had to miss any days from their main activity in the previous 4 weeks due to illness or injury and if so how many days. The number of days missed due to illness or injury is used as a proxy for illness. Since most of the households in the sample are farming households and most of their energy is spent engaged in agricultural activities, a proxy for shocks to energy expenditure is the number of days the individual participated in a traditional labor sharing arrangement. A labor sharing arrangement is when labor is shared across households to help with demanding agricultural tasks. Work parties can consist of up to fifteen people (neighbors, family and friends). Because most of the villages have a tradition of mutual assistance, it is unlikely that a household which has been asked to participate in a labor sharing arrangement would decline to provide assistance, which allows for the number of days participating in a labor sharing arrangement to be treated as exogenous to the household decision making process.

¹⁷In order to be included in the fixed-effects regression, an individual must have at least two observations. To check the robustness of the results, regressions are also run on a sub-sample consisting of individuals with complete information for all three rounds.

¹⁸ Food aid refers to free aid not food for work.

¹⁹ Gifts were reported at the individual level, the sum of each individual household member's aid receipts by gender make up the male/female household level food aid receipts.

Variables controlling for household composition include household size, the number of household members which are adult men, and the number of household members which are adult women. Additional control variables are logged of household livestock value per capita and a dummy variable for whether the individual is pregnant or breastfeeding (included only in the female regressions). The appendix summarizes the individual and household variables used in the regressions.

As described earlier, the aid agency determines which household member is eligible to receive the aid from the distribution site. Two of the six villages had an NGO which was responsible for aid allocations while the four other villages received aid from the government run safety net program. The government run food aid program requires the household head to retrieve the aid from the distribution site while NGOs tend to target women and households with children under the age of five. The government policy on free distribution states that the household head may send another household member to collect the aid if the head is unable to make it to the distribution center. Approximately 85% of the aid recipients in the villages with the government run safety net were household heads and in the remaining households, aid was received primarily by the head's spouse or child and in almost every case the head was elderly or disabled.²⁰

Table 1 presents aid recipient characteristics, and shows that a nontrivial share of aid recipients are not household heads. Table 1 includes only the villages that received aid in the given year. In round 1, two villages received aid, in round 2, five villages received aid and in round 3, three villages received aid. The table shows that in the households where the household head was not the aid recipient, the household head tended to be older than the household heads in the households where the household head was the aid recipient. In round 2, for example, the average age of the aid recipient was 41 years old. The average age of the household head if the household head was the recipient was 42 years old, while the average age of the household head if the head was not the recipient of aid was 54 years old with the average age of the recipient for these households being 32 years old. The NGO administered aid programs distributed aid in round three. This accounts for the small share of household heads as the aid recipient. In these two villages which had an NGO, Imdibir and Korodegaga, many of the households reported the aid recipient as a child under the age of five, which accounts for the low average age of the aid recipient in round three. In the analysis, the mother of these recipients is treated as the aid recipient. In less than 20 cases more than one household member received aid.²¹

²⁰Between 9% and 35% of the sample of aid-receiving households received aid by a household member other than the household head. In these households the average age of the household head is approximately ten years older than that of the household head of households where the aid recipient was the household head.

²¹Almost all of the households which reported more than one household member receiving aid were in round two and primarily come from Korodegaga, a village that receives aid from an NGO. In round two every household received aid with the aid recipient being the household head. Households with more than five household members were treated as two households and the spouse of the head was also eligible to receive aid from the distribution site for the household.

This paper focuses on the effects that food aid has on adult nutrition and whether the gender of the aid recipient plays a role in how aid is distributed within the household.²² As mentioned earlier, aid is primarily administered to the head of the household and when the head is unable to make it to the distribution center another household member is responsible for picking up the food aid. A couple of problems arise when comparing health outcomes across gender recipients: (1) what matters is not who obtains the aid but who controls the aid when the aid is in the household. Unfortunately the data does not have information on who controls the household resources (in particular, who controls how aid is allocated within the household). (2) A second concern is that comparison across gender recipients could be misleading if female-headed households are different from male-headed households. This problem should not cause concern if these differences are fixed, time-invariant characteristics. By running a fixed effects regression, these differences are removed.

Table 2 shows the share of aid recipient households that had an aid recipient which was a different gender than the household head. 13% of the sampled households are female-headed households. 43% of female-headed households and 14% of the male-headed households had an aid recipient that was a different gender than the head of the household in at least one of the rounds. This allows for investigation of whether gender of the recipient matters for how aid is allocated within the household. Table 2 shows that most of the households which had a recipient who was a different gender than the household head comes from female headed households. Between 14 and 50% of female headed households had a male aid recipient. This could be due to the fact that the recipient must travel to the distribution site and carry the aid back to the household, a task that women would prefer men to do or because the women need to remain home to care for the children. The differences across rounds in the share of households with a aid recipient who is a different gender than the household head reflect the fact that villages received aid in different rounds.²³ In particular, round three reflects the targeting strategy of the NGOs, showing that 40% of the male-headed households had a female recipient.

Table 2 also describes other household characteristics for both male-headed and female-headed households across the three rounds. Table 2 suggests that male and female-headed households are similar across observables. Female-headed households have slightly lower per capita consumption than male-headed households. Per capita consumption is lowest in round 1, which follows the 1994 drought and it appears that female-headed households suffered the most from the drought but the effect did not appear to be permanent. Livestock holdings fall slightly after round one suggesting that households may have responded to the drought by selling some of their livestock.²⁴ Female-

²²Recall that individual consumption of aid is not observed and it is impossible to assess intra-household allocations directly.

²³Round one consists of two villages, round two consists of five villages and round three consists of three villages. Four of the six villages received aid in only one round, the other two villages received aid in all three rounds.

²⁴See Fafchamps et al. (1998) for a discussion on livestock sells as a way to cope with negative income shocks.

headed households tend to have slightly fewer household members. An interesting observation from table 2 is that total household aid receipts are not the same across male and female-headed households, except for round two. In round one, male-headed households receive more than twice as much aid as female-headed households. In round three, female-headed households received slightly more aid than male-headed households, but this could be due to the targeting strategy of the NGOs.

Tables 3, 4 and 5 replicate the tables from Dercon and Krishnan (2000) and present a summary of individual BMI scores across rural Ethiopia by peasant associations (villages) and round. Mean levels of BMI are between 19 and 20, which is typical in other rural areas in developing countries, except for Imdibir whose mean index is as low as 16.56 for men. We are interested in how food aid buffers fluctuations in the Quetelet index. Table 3 provides the same information as figures 1-3, depicting the fluctuations in BMI over a short time frame

Table 4 presents the average of the minimum Quetelet index as a percentage of the maximum Quetelet index for men and women by village. Table 4 suggests a significant amount of variability in the Quetelet index within villages. The lowest level of the index as a percentage of the highest level is 87.18 for women and 88.10 for men. These results suggest a weight loss of 12–13 percent over a 18 month period. These measures are lower than the measures reported in Dercon and Krishnan (2000), recall they used all 15 villages whereas the villages used in this study were some of the poorest villages, so we expect there to be a higher level of variability in nutritional status. There appears to be some differences across low and high asset households within villages. For example, in Geblen, low-asset households appear to be able to smooth consumption more than high-asset households, with men being able to smooth nutritional status more than women. Imdibir has the highest variability in nutritional status with women in low-asset households faring the worst.

Table 5 is of particular interest because it relates the sample used in the analysis to chronic energy deficiency. Severe malnutrition has been associated with decreased productivity. Similar to Dercon and Krishnan (2000) about a quarter of the sample is malnourished, reporting a Quetelet index below 18.5 with a significant proportion displaying a Quetelet index below 17. Men are more likely to be malnourished. The numbers in table 5 also reflects the significant movement between healthy and unhealthy weight over time.

Table 6 presents the contribution of food aid to monthly food consumption. In the rounds that a village receives aid, food aid contributes significantly to total household food consumption. Food consumption in the form of aid is as high as 27 percent in Kordegaga to as low as 4 percent in Imdibir. Overall food aid contributes between 5 and 20 percent to total household food consumption. These tables suggest food aid could be useful in minimizing food fluctuations.

6 Empirical Specification

Adult nutrition depends on the intrahousehold allocation of food consumption and energy expenditure which is determined by individual (\mathbf{x}_i), household (\mathbf{S}_j), and village characteristics (\mathbf{M}_v).²⁵ If individual unobservables were distributed identically and uncorrelated over time, we could estimate the reduced form equation by OLS:

$$H_{ijvt} = \alpha_0 + \beta_1 \mathbf{x}_{ijvt} + \beta_2 a_{ijvt} + \beta_5 \mathbf{s}_{jt} + \beta_6 \mathbf{m}_{vt} + u_i + \mathbf{S}_j + \mathbf{M}_v + \eta_{ijvt} \quad (8)$$

where ijv indexes individual i in household j of village v and t indexes round of observation (six month time period). Individual health endowment and time-invariant individual characteristics are captured in u_i and η_{ijvt} is the disturbance term.

For reasons described earlier, individual unobservables are likely to be correlated over time. Because u_i may be correlated with the observable variables, OLS will not give consistent estimates. For example, some household individuals may not be as vulnerable to food and income shocks as others. If this is known by the household then less aid will be allocated to those household members. Including individual fixed effects requires that time-invariant characteristics be excluded so that consistent estimates of β_2 can be obtained.

The dependent variable is the Quetelet index. The variables of interest are per capita aid allocations to male and female household members. The number of days the individual was unable to perform their main activity in the previous 4 weeks due to illness or injury proxies for illness or disease that may have an adverse effect on individual health. A proxy for shocks to energy expenditure is the number of days the individual participated in a traditional labor sharing arrangement. Additional individual variables include whether or not the individual was the aid recipient and for the female equation, whether or not the individual was pregnant or breastfeeding. Household variables include, household size, the number of household members which are adult men, the number of household members which are adult women, and the log of household livestock value per capita.

While the fixed-effects regression removes the time-invariant variables which may be correlated with the other covariates, they do not difference out unobservable time-varying village factors that may affect aid distributions and nutritional status. One possible example, if seasons are characterized as peak and lean seasons, households may allocate fewer resources to household members who are less vulnerable to food fluctuations during lean seasons. Due to the relatively short time frame in between rounds individual adult nutrition may be vulnerable to season changes. To deal with this

²⁵Refer to Pitt et al. (1990) Rosenzweig and Schultz (1982) for a discussion on intrahousehold allocation

concern the regressions include time-varying village effects, which will capture village changes in between survey rounds (whether the survey was conducted during a lean season or post harvest).

7 Results

Table 7 reports the fixed effects results for adult men and women. The variables of interest are the per capita amounts of free distribution aid receipts by gender of the recipient. Table 7 shows that free distribution is associated with an improvement in the BMI of male adult members but not for women adult members. For men, this improvement is irrespective of the gender of the aid recipient, an F-test for the equality of aid effects across gender recipients failed to be rejected. A ten birr increase in aid receipts increases male BMI by .3 points. While this does not appear to be significantly large enough to have any real effect on adult health, it accounts for approximately 15% of the intertemporal fluctuations in BMI.

Several stories can explain this basic finding. One story could be that male household members are more likely to consume aid receipts themselves, while female household members are more likely to give additional resources, in the form of food-aid, to weaker household members: children and the elderly.²⁶ Another story could be that female household members have no control over household resources and male household members are consuming all aid receipts. Alternatively, these results are consistent with aid recipients allocating more aid to household members whose market returns are higher or engage in activities that expend higher levels of energy.

Additional results to note in table 7 is that the illness and energy expenditure variables have the correct sign and are statistically significant. Days in a labor sharing arrangement is insignificant in the female regressions, primarily because women are less likely to participate in labor sharing arrangements. The household composition variables have no effect on women's nutrition but do impact men's nutrition. In particular, men benefit more in larger households but the more adult women in the household the worse men are as measured by BMI.

To investigate the role food-aid has on adult nutrition further table 8 replicates the regressions from table 7 separately for low and high asset households. Low asset households are households whose livestock holdings in round two were lower than the village median livestock holdings from that year.²⁷ These regressions are run to investigate whether low and high asset households deal with

²⁶In results not shown, food-aid to female recipients has a positive impact on girls', between the ages of five and nine, height for age and boys', between the ages of five and nine, weight for height. Food-aid to female recipients has a negative impact on girls', between the ages of five and nine, weight for height. Food-aid to male recipients has no impact on children's health.

²⁷Round two was used because households adjusted their livestock holdings in round one in response to the 1993

shocks differently. The results are slightly different than the results from table 7. Men in low-asset households do not appear to benefit from aid receipts, but this is primarily due to larger standard errors. For men in high asset households, aid receipts to male recipients is still significant but larger in magnitude, a ten birr increase in aid receipts account for approximately 20% of the intertemporal fluctuations in BMI, again an F-test for the equality of aid effects failed to be rejected.

For female household members, the results are different from table 7 and across low and high asset households. For low asset households the coefficient on aid receipts is negative, regardless of the gender of the aid recipient. Aid receipts to male recipients are negative and statistically significant, we fail to reject the null hypothesis for the equality of aid effects across gender recipients. For female household members in high asset households, aid receipts to female recipients is positive and statistically significant, the coefficient on aid receipts to female recipients is statistically significantly different from aid receipts to male recipients. A ten birr increase in aid receipts increase female BMI by .75 points. This accounts for almost 40% of fluctuations in female BMI observed over this eighteen month period.

The results presented so far suggest that aid receipts to low asset households are not sufficient to have any effect on the nutritional status of adult household members, while aid receipts in high asset households improve adult nutrition. Which household members benefit from aid receipts in high asset households depends on the gender of the aid recipient. In particular, women will only benefit if the aid recipient is female. The results for high asset households are consistent with the model above, where households allocate more aid to household members who have a higher return to health, male household members, but also where women activities are valued more by other women. The results are also consistent with a model where women with more bargaining power are able to favor themselves or other household members more. This will be explored more in the next subsection.

The regressions in table 7 and table 8 use household members who were present in the household in at least two rounds. Some household members may migrate in and out of the household which could give rise to selectivity bias. If household members are migrating in and out of the household because the household receives food-aid, then there is an individual time-varying unobservable characteristic that may be correlated with the regressors, in particular aid receipts. For example, sons and daughters may temporarily return home if their parents receive aid and they do not. One way to address this concern is to restrict the analysis to household members who were present in all three rounds. Tables 9 and 10 presents the results after imposing the sample restrictions. The results are unchanged by this restriction which suggest that the results presented in tables 7 and 8

drought. The results do not change if different rounds were used to obtain median livestock holdings.

are not affected by selectivity bias.

7.1 Bargaining Power

The regressions presented in table 7 and 8 show that women do not appear to benefit from aid receipts, they are either worst off if the household receives aid (women in low asset households with male recipients) or they only benefit if they are the aid recipients (women in high asset households). This section investigates whether women with more bargaining power within the household benefit from aid receipts allocated to male recipients.

Women in Ethiopia have witnessed improved conditions and opportunities under the current government. Women have the right to own land, work in wage labor, and participate in local and national government organizations. While on paper the conditions for women are improving, local customs still restrict women in many ways. The questionnaire for round four (1997) had a module specifically designed to infer the spouse's bargaining power within marriage. Questions were asked about assets brought into the marriage, assets obtained during marriage and how assets would be divided if the marriage ended in divorce or someone died. Much of the literature on bargaining have used information on assets brought into the marriage, but because many of the households used in this analysis are extremely poor, few women had assets that they brought to the marriage. A more important measure of how much bargaining power an individual has is how much they would be entitled to if they left the marriage (Manser and Brown, 1980; McElroy and Horney, 1981). The economic model of marriage states that an individual will stay in the marriage if the utility they receive in the marriage is greater than the utility they would receive outside of the marriage. For women with very little rights, they are more likely to stay in an abusive or submissive marriage, while women with more rights are more likely to either demand more rights within the marriage or leave the marriage.

One of the questions in the fourth round module asks who would receive ownership of the household land if the husband and wife were to divorce. The options were: the land would go to the husband, the wife, the children or divided equally between the wife and husband. From the full sample of households surveyed and the sample of households used in the analysis, 42% stated that all or half of the land would go to the wife. Land in Ethiopia plays an important role. 85% of the population make their living off their land. Average per capita land holdings is 1.5 hectares and falling. The government has full ownership over land and ensures that anyone who wants land will have access to land. Historically women did not have rights to land.

A new variable was created which equals the amount of household land holdings allocated to the

wife if the marriage were to end in divorce interacted with male aid receipts. The value is positive if the wife would receive all or half of the land and zero if full ownership would go to the husband or the children. Table 11 replicates the results from tables 7 and 8 for women including this new variable. Regression 1 presents the results for all women pooled together, regression 2 and regression 3 presents the results for low and high asset households respectively. For the full sample and for women in high asset households, having control of the household land in case of divorce has no effect on aid allocations for women. For women in low asset households, the interaction term is positive and significant. The results suggests that women in low asset households with no bargaining power are adversely affected by aid receipts received by male household members, for women with bargaining power the effect is less negative. The results show that women with more rights or power within the household are able to demand more resources than women in households with less rights.

8 Conclusion

This paper investigated the effects of food aid in the form of free distribution on adult nutrition using fixed effects regression methods. Results show that male adult household members are the primary beneficiaries of food aid, this is consistent with a theory where additional resources are allocated to household members who have a higher return to nutrition. Female recipients in high-asset households tend to invest aid receipts into female household members. Women in low asset households appear to be adversely affected by aid receipts distributed to male recipients, and evidence suggests that women with little bargaining power suffer the most.

This analysis is important for public policy because it reveals how public assistance resources effect the nutritional status of adults. Because of the role health and productivity plays in escaping poverty it is important to evaluate not only targeting efficiencies of public assistance programs, but also the effects that safety nets play in improving the health and potential productivity of adults. If it is true that improved health increases productivity, then the results suggest that aid may have an effect on male productivity through health improvements.

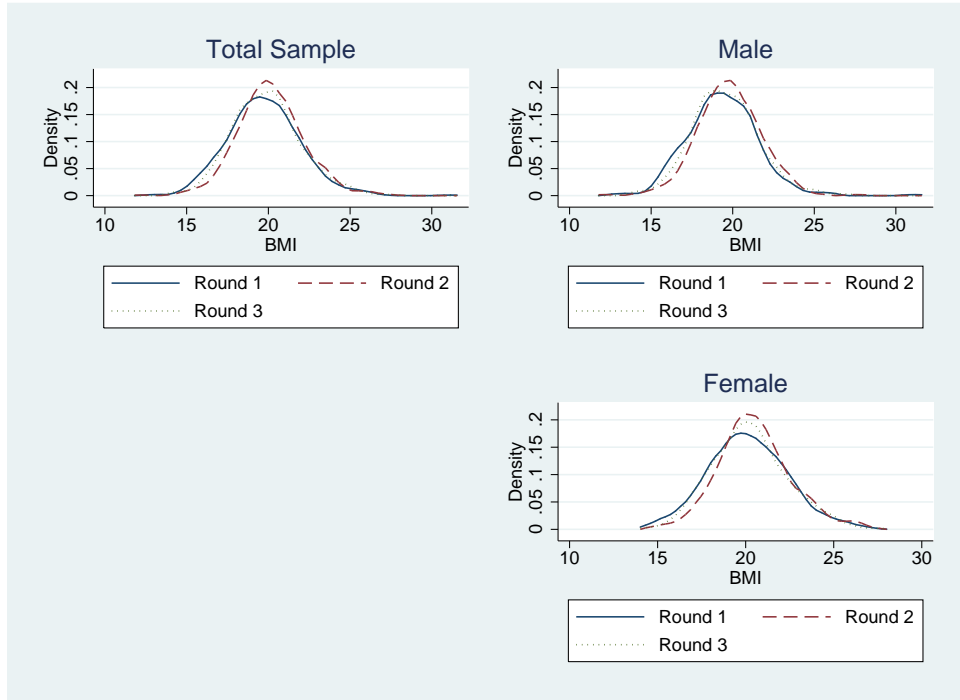


Figure 1: Distribution of Adult BMI

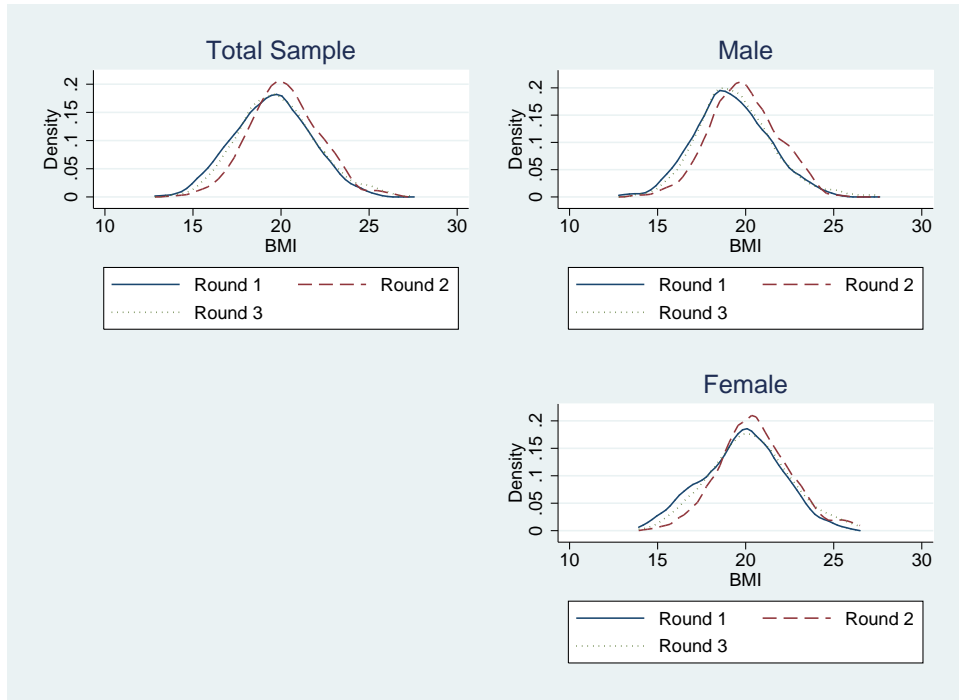


Figure 2: Distribution of Adult BMI: Low-Asset Households

Notes: Low-asset households are households with livestock holdings less than the median village livestock holdings

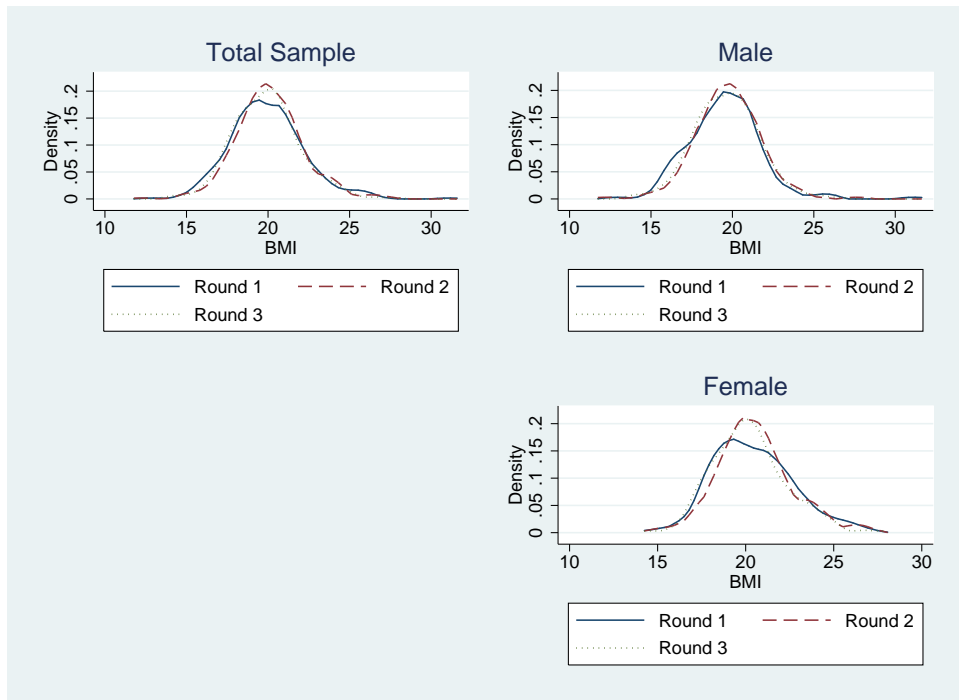


Figure 3: Distribution of Adult BMI: High-Asset Households

Notes: High-asset households are households with livestock holdings greater than or equal to the median village livestock holdings

Table 1: Recipient Characteristics

Round	Female Head (%)	Female Aid Recipient (%)	HH Head Aid Recipient (%)	Average Age of Aid Recipient	Average Age of Aid Recipient (Non-Head Recipient)	Average Age of HH Head (Non-Head Recipient)	Average Age of HH Head (Head Recipient)
1	15.56	18.89	92.22	40.67	28.71	43.71	41.32
2	14.02	16.24	89.30	40.58	32.14	53.34	41.40
3	12.16	43.24	56.76	29.75	12.27	41.95	43.07
Total	14.02	21.38	84.37	38.76	22.43	46.99	41.57

Notes: Sample includes all households that received aid. Recipient households consist of households that reported receiving aid during the 1994-1995 survey rounds (75 households in two villages in round 1, 245 households in five villages in round 2 and 48 households in three villages in round 3).

Table 2: Descriptive Statistics by Gender of Household Head

	Round 1		Round 2		Round 3	
	Male Head	Female Head	Male Head	Female Head	Male Head	Female Head
Share Male Recipients	0.96	0.14	0.97	0.53	0.68	0.44
Share Female Recipients	0.07	0.86	0.09	0.63	0.42	0.56
Aid PC (Male Recipient)	10.37	0.71	9.03	4.18	1.81	1.64
	(7.70)	(1.83)	(10.67)	(5.49)	(1.63)	(2.72)
Aid PC (Female Recipient)	0.45	3.80	0.60	6.14	0.73	2.69
	(2.40)	(3.53)	(2.69)	(7.45)	(1.67)	(3.00)
Log Food Cons. PC	3.18	2.71	3.91	3.88	3.64	3.59
	(0.99)	(1.03)	(0.80)	(0.74)	(0.80)	(0.68)
Log Non-Food Exp. PC	1.99	1.66	1.93	2.18	2.17	1.95
	(0.93)	(0.90)	(1.05)	(1.18)	(0.99)	(1.08)
Hhsize	6.16	5.97	6.08	5.92	6.13	5.84
	(2.35)	(2.36)	(2.38)	(2.44)	(2.40)	(2.01)
Log Livestock Value	4.70	4.70	4.49	4.56	4.41	4.32
	(2.01)	(2.06)	(2.07)	(1.83)	(2.10)	(2.19)

Notes: Sample consists of 292 households. Standard deviations in parenthesis. Recipient households consist of households that reported receiving aid during the the 1994-1995 survey rounds. Share male recipients and share female recipients may sum to more than one if households had more than one aid recipient.

Table 3: Mean BMI Score

Peasant Associations	Round 1		Round 2		Round 3	
	Men	Women	Men	Women	Men	Women
geblen	20.11	20.55	19.87	19.45	20.16	19.35
	(1.80)	(1.77)	(1.56)	(1.25)	(1.45)	(1.77)
dinki	19.35	19.61	19.66	19.56	19.02	19.59
	(1.93)	(2.07)	(1.97)	(1.74)	(2.12)	(1.78)
shumsha	20.58	21.21	20.25	21.26	20.93	21.52
	(2.47)	(2.04)	(1.94)	(2.00)	(2.05)	(2.16)
korodegaga	18.72	19.88	19.39	20.63	19.11	20.22
	(1.54)	(2.30)	(1.76)	(2.11)	(1.51)	(2.02)
Imdibir	16.56	18.07	18.32	19.62	17.38	18.95
	(2.33)	(2.35)	(2.13)	(1.87)	(1.89)	(2.02)
doma	19.26	19.86	20.36	20.81	19.07	19.64
	(1.85)	(2.02)	(1.98)	(2.12)	(1.84)	(2.00)
Total	19.38	20.13	19.80	20.52	19.54	20.22
	(2.14)	(2.23)	(1.93)	(2.06)	(2.02)	(2.13)

Notes: Sample includes 363 men and 346 women. Standard Deviations in parenthesis.

Table 4: Mean of Minimum BMI as a percentage of Maximum BMI

Peasant Associations	Low-Asset Households		High-Asset Households	
	Male	Female	Male	Female
Geblen	94.22	92.00	92.86	89.65
Dinki	88.29	87.37	88.85	89.36
Shumsha	90.91	92.08	89.46	90.93
Korodegaga	93.55	90.88	92.72	91.86
Imdibir	89.25	87.18	88.10	89.64
Doma	89.00	88.29	89.79	89.42
Total	90.99	89.76	90.79	90.69

Table 5: Chronic Energy Deficiency in Rural Ethiopia, 1994-95

Measure of Energy Deficiency	Round 1		Round 2		Round 3	
	Male	Female	Male	Female	Male	Female
Normal: $bmi \geq 18.5$	67.37	76.71	76.15	85.59	69.97	79.05
Grade I: $17 \geq bmi < 18.5$	19.64	16.46	17.82	11.11	21.02	15.24
Grade II: $16 \geq bmi < 17$	8.46	3.73	3.45	1.8	6.31	4.44
Grade III: $bmi < 16$	4.53	3.11	2.59	1.5	2.7	1.27
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 6: Fraction of Food Consumption in the Form of Aid

Peasant Associations	Round 1	Round 2	Round 3	Total
Geblen	0.00	7.69	0.00	7.69
Dinki	0.00	23.58	0.00	23.58
Shumsha	20.47	11.68	4.05	13.28
Korodegaga	26.14	27.21	11.98	24.98
Imdibir	0.00	0.00	4.64	4.64
Doma	0.00	5.48	0.00	5.48
Total	21.35	17.1	5.85	16.06

Notes: Sample includes 292 households. Zeros represent the round the village did not receive aid.

Table 7: Fixed-Effects Estimation of The Effects of Free Distribution on Adult Nutritional Status

	Men (1)	Women (2)
Aid to Male Recipient	0.028** (0.013)	-0.003 (0.007)
Aid to Female Recipient	0.029* (0.015)	0.020 (0.025)
Aid Recipient	0.128 (0.184)	-0.232 (0.188)
Pregnant or Breastfeeding		0.483*** (0.159)
Num of Days not Working	-0.021** (0.010)	-0.025** (0.012)
Days in Labor Sharing	-0.113** (0.053)	0.090 (0.056)
Household Size	0.183** (0.079)	-0.143 (0.098)
Num Male Adults	0.011 (0.171)	0.157 (0.160)
Num Female Adults	-0.341* (0.175)	-0.144 (0.223)
Log Livestock Value	-0.033 (0.064)	0.010 (0.068)
Time-Varying Village Effects	Yes	Yes
Test For Equality of Aid		
Male = Female: P-value	0.984	0.338
R-squared Within Model	0.15	0.12
Obs.	1012	970
Num. of Groups	363	346

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55. Only includes households which had information for at least one male and one female.

Table 8: The Effects of Free Distribution on Adult Nutritional Status by Asset Holdings

	Low Asset Holdings		High Asset Holdings	
	Male (1)	Female (2)	Male (3)	Female (4)
Aid to Male Recipient	0.012 (0.011)	-0.028** (0.011)	0.039** (0.016)	0.005 (0.007)
Aid to Female Recipient	0.026 (0.018)	-0.032 (0.026)	0.025 (0.025)	0.075** (0.032)
Aid Recipient	-0.016 (0.243)	0.004 (0.260)	0.168 (0.244)	-0.611** (0.269)
Pregnant or Breastfeeding		0.321 (0.249)		0.496** (0.196)
Num of Days not Working	-0.035** (0.014)	-0.008 (0.016)	-0.008 (0.012)	-0.044** (0.019)
Days in Labor Sharing	-0.106* (0.054)	0.134 (0.118)	-0.126 (0.097)	0.131* (0.070)
Household Size	0.203** (0.100)	-0.240 (0.178)	0.221* (0.128)	-0.041 (0.137)
Num Male Adults	-0.248 (0.206)	0.140 (0.316)	0.090 (0.226)	0.086 (0.191)
Num Female Adults	-0.467* (0.279)	0.073 (0.316)	-0.242 (0.226)	-0.393 (0.348)
Log Livestock Value	-0.033 (0.067)	0.016 (0.073)	0.339 (0.353)	0.172 (0.390)
Time-Varying Village Effects	Yes	Yes	Yes	Yes
Test For Equality of Aid Male = Female: P-value	0.417	0.867	0.572	0.030
R-squared Within Model	0.24	0.15	0.13	0.16
Obs.	445	446	567	524
Num. of Groups	159	158	204	188

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55. Only includes households which had information for at least one male and one female.

Table 9: Fixed-Effects Estimation of The Effects of Free Distribution on Adult Nutritional Status: Sample Restrictions

	Men	Women
	(1)	(2)
Aid to Male Recipient	0.031** (0.014)	-0.005 (0.007)
Aid to Female Recipient	0.034** (0.016)	0.014 (0.026)
Aid Recipient	0.164 (0.164)	-0.142 (0.197)
Pregnant or Breastfeeding		0.532*** (0.167)
Num of Days not Working	-0.019* (0.011)	-0.021* (0.012)
Days in Labor Sharing	-0.074 (0.052)	0.085 (0.054)
Household Size	0.182** (0.084)	-0.188* (0.112)
Num Male Adults	-0.117 (0.158)	0.193 (0.166)
Num Female Adults	-0.380** (0.181)	-0.148 (0.243)
Log Livestock Value	-0.043 (0.070)	-0.009 (0.072)
Time-Varying Village Effects	Yes	Yes
Test For Equality of Aid		
Male = Female: P-value	0.843	0.450
R-squared Within Model	0.15	0.14
Obs.	858	834
Num. of Groups	286	278

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55. Only includes households which had information for at least one male and one female. Individuals present in all three rounds.

Table 10: The Effects of Free Distribution on Adult Nutritional Status by Asset Holdings: Sample Restrictions

	Low Asset Holdings		High Asset Holdings	
	Male	Female	Male	Female
	(1)	(2)	(3)	(4)
Aid to Male Recipient	0.024 (0.018)	-0.031*** (0.011)	0.034* (0.018)	0.005 (0.007)
Aid to Female Recipient	0.050* (0.027)	-0.029 (0.026)	0.021 (0.024)	0.062* (0.037)
Aid Recipient	0.092 (0.236)	-0.009 (0.259)	0.204 (0.222)	-0.456 (0.296)
Pregnant or Breastfeeding		0.387 (0.261)		0.493** (0.210)
Num of Days not Working	-0.038*** (0.014)	-0.002 (0.017)	0.001 (0.013)	-0.040** (0.019)
Days in Labor Sharing	-0.107* (0.057)	0.122 (0.097)	-0.052 (0.091)	0.133* (0.074)
Household Size	0.205* (0.118)	-0.361* (0.209)	0.197 (0.140)	-0.014 (0.144)
Num Male Adults	-0.367* (0.209)	0.088 (0.334)	-0.053 (0.214)	0.157 (0.196)
Num Female Adults	-0.523* (0.312)	0.238 (0.348)	-0.288 (0.212)	-0.511 (0.372)
Log Livestock Value	-0.053 (0.072)	-0.000 (0.077)	0.287 (0.347)	0.144 (0.423)
Time-Varying Village Effects	Yes	Yes	Yes	Yes
Test For Equality of Aid				
Male = Female: P-value	0.295	0.915	0.615	0.125
R-squared Within Model	0.24	0.17	0.13	0.18
Obs.	381	390	477	444
Num. of Groups	127	130	159	148

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55. Only includes households which had information for at least one male and one female. Individuals present in all three rounds.

Table 11: Fixed-Effects Estimation of The Effects of Free Distribution on Female Nutritional Status: Bargaining Power

	Full Sample	Low Asset	High Asset
	(1)	(2)	(3)
Land*aidmpc	0.002 (0.010)	0.024* (0.015)	-0.018 (0.012)
Aid to Male Recipient	-0.007 (0.009)	-0.052*** (0.020)	0.014 (0.009)
Aid to Female Recipient	0.018 (0.025)	-0.050 (0.031)	0.076** (0.032)
Aid Recipient	-0.220 (0.193)	0.049 (0.275)	-0.616** (0.272)
Pregnant or Breastfeeding	0.564*** (0.156)	0.495* (0.253)	0.478** (0.196)
Num of Days not Working	-0.025** (0.012)	-0.008 (0.016)	-0.044** (0.020)
Days in Labor Sharing	0.100* (0.056)	0.150 (0.117)	0.139** (0.066)
Household Size	-0.180* (0.096)	-0.363** (0.180)	-0.038 (0.137)
Num Male Adults	0.199 (0.157)	0.102 (0.300)	0.134 (0.187)
Num Female Adults	-0.231 (0.222)	-0.012 (0.324)	-0.401 (0.345)
Log Livestock Value	-0.003 (0.073)	0.008 (0.079)	0.143 (0.392)
Time-Varying Village Effects	Yes	Yes	Yes
R-squared Within Model	0.13	0.17	0.17
Obs.	944	423	521
Num. of Groups	337	150	187

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Clustered at the household level. Sample includes women between the ages of 17 and 55. Only includes households which had information for at least one male and one female. Land*aidmpc is the per capita household land holdings interacted with male aid receipts. Land is positive only if the wife would receive half or all the land holdings if the couple were to get a divorce.

A Appendix

Table 12: Data Description

Variables Used in the Analysis

<u>Individual Characteristics</u>	
Lactating	Dummy variable equal to one if female is pregnant or breast-feeding.
Days of Lost Work	The number of days in the past four weeks respondent was unable to perform their main activity.
Days of Labor Sharing	The number of days in the past four weeks respondent participated in a traditional labor sharing arrangement.
Aid Recipient	Dummy variable equal to one if individual is the aid recipient.
<u>Household Characteristics</u>	
Aid Per Capita (m/f)	Amount of aid the household received since the previous survey round converted to monthly Birr value (male or female recipient).
Household Size	The number of household members.
Number of Males	The number of household members who are male and between the ages of 17 and 55.
Number of Females	The number of household member who are female and between the ages of 17 and 55.
Log Livestock Value	Value of livestock holdings per capita.
Land Holdings (Ha)	Total household land holdings in hectares reported in round 1.

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